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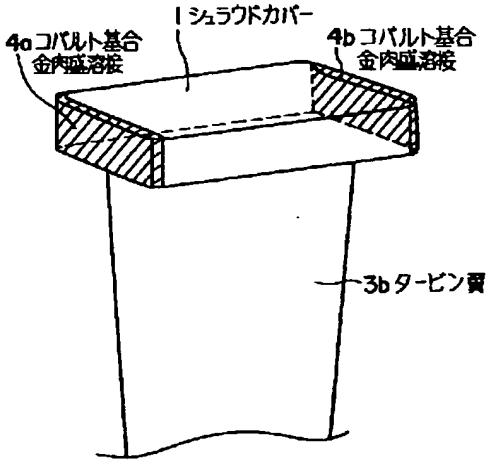
(54)【発明の名称】　蒸気タービン動翼及びこの動翼を有する蒸気タービン

(57)【要約】

【課題】　動翼先端シュラウドカバー接触面の耐摩耗性の向上を図った蒸気タービン動翼、及びこの動翼を備えた蒸気タービンを提供することを課題とする。

【解決手段】　先端にシュラウドカバーを形成した動翼において、周方向前後端で隣接する他の動翼のシュラウドカバーとの接触面に、コバルト基合金（商品名：ステライトＮｏ．６）の溶接材を肉盛り溶接して蒸気タービン動翼を構成し、接触面の耐摩耗性を向上して振動減衰効果の長期的維持を図り、翼破損等の事故に至る要因を除去して、安全性、安定性を確保した蒸気タービン動翼を得た。



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【特許請求の範囲】

【請求項１】　先端にシュラウドカバーを形成した動翼において、周方向前後端で隣接する他の動翼のシュラウドカバーとの接触面に、重量％でＣｒ２６～３２％、Ｗ３～６％、Ｆｅ＜３％、Ｍｏ＜１％、Ｎｉ＜３％、Ｃ０．９～１．４％、Ｓｉ＜２％、Ｍｎ＜１％、残部Ｃｏよりなるコバルト基合金の溶接材を肉盛り溶接したことを特徴とする蒸気タービン動翼。

【請求項２】　請求項１に記載の動翼を有してなることを特徴とする蒸気タービン。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、動翼先端シュラウドカバー接触面の耐摩耗性の向上を図った蒸気タービン動翼、及びこの動翼を備えた蒸気タービンに関するものである。

【０００２】

【従来の技術】高速回転する蒸気タービンは、その安全かつ安定操業のために、振動に伴う諸問題への対応がなされており、その一例として隣接する翼相互間を綴りあわせて一体化、又は実質的に一体化した構造として、防振策としているものがある。

【０００３】この様な従来の蒸気タービン翼の綴り方法の一つを図３により説明すると、翼先端部においてタービン翼３ｂと一体で整形したシュラウドカバー１を、周方向で隣り合うタービン翼３ａ、３ｃのシュラウドカバー２ａ、２ｂと接触させることによって、高い振動減衰効果を生み出す方法がしばしば見受けられる。

【０００４】しかし、前記シュラウドカバー１とシュラウドカバー２ａの接触面、及びシュラウドカバー１とシュラウドカバー２ｂの接触面のそれぞれに圧縮の面圧が作用し、かつ運転中に生じる翼の振動等により繰返しすべりが発生した場合、これらの接触面に摩耗が生じ得る。

【０００５】この接触面での摩耗が進行した場合には、シュラウドカバーの形状寸法が所定値から変化するために期待する振動減衰効果が得られないのみならず、翼破損等の重大損害を引き起こす可能性がある。

【０００６】

【発明が解決しようとする課題】前記した様に、従来の綴り方式のものにあっては、摩耗が生じ、これに伴い所期の振動減衰効果が得られずに翼破損等の重大損害を引き起こす可能性を含んだ不具合を有するものであった。

【０００７】これは、蒸気タービン動翼においては、シュラウドカバーは翼本体と同一材料で構成されているために、耐熱性の配慮はなされるものの、耐摩耗性に関しては配慮に欠けるところがあり、これが一因となって十分な振動減衰を得るに至らず、前記した翼破損事故の可能性と隣り合わせとなるというものであった。

【０００８】本発明はこの様な背景の下において提案されたものであり、前記シュラウドカバーの接触面の耐摩耗性を向上し、長期間に亘って安全、かつ安定的に使用に供し得るタービン翼及び同タービン翼を備えた蒸気タービンを提供することを課題とするものである。

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【０００９】

【課題を解決するための手段】本発明は、前記した課題を解決すべくなされたもので、先端にシュラウドカバーを形成した動翼において、周方向前後端で隣接する他の動翼のシュラウドカバーとの接触面に、重量％でＣｒ２６～３２％、Ｗ３～６％、Ｆｅ＜３％、Ｍｏ＜１％、Ｎｉ＜３％、Ｃ０．９～１．４％、Ｓｉ＜２％、Ｍｎ＜１％、残部Ｃｏよりなるコバルト基合金の溶接材を肉盛り溶接した蒸気タービン動翼を提供するものである。

【００１０】すなわち、本発明によれば、前記した成分のコバルト基合金（商品名：ステライトＮｏ．６）の溶接材を選定し、これを相互に隣接する動翼のシュラウドカバーの接触面に肉盛り溶接して各シュラウドカバーの接触面の耐摩耗性を向上し、振動減衰効果の長期的維持を図り、翼破損等の事故に至る要因を生じさせず、安全性、安定性及び長寿命を確保したタービン動翼を得るものである。

【００１１】また本発明は、前記した構成の動翼を有してなる蒸気タービンを提供するものである。

【００１２】すなわち、本発明の蒸気タービンによれば、前記した様に耐摩耗性に富んだシュラウドカバーを有する動翼を採用しているので、シュラウドカバーの接触面圧が上がっても同接触部は摩耗せず、翼の振動特性が変化して共振をおこしたりすることは無く、安定操業と長寿命の確保を図るものである。

【００１３】

【発明の実施の形態】本発明の実施の一形態について図１及び図２に基づいて説明する。３ｂはタービン翼で、その先端にはシュラウドカバー１を一体的に形成している。そして同シュラウドカバー１の一端には、コバルト基合金肉盛溶接４ａがなされ、他端には同様にコバルト基合金肉盛溶接４ｂが形成されている。

【００１４】また、図示省略されているが、前記タービン翼３ｂに周方向前後で隣接する他のタービン翼の先端に設けたシュラウドカバーにも、前記シュラウドカバー１のコバルト基合金肉盛溶接４ａ及びコバルト基合金肉盛溶接４ｂに対向してコバルト基合金肉盛溶接がそれぞれ形成されている。

【００１５】このシュラウドカバー１とコバルト基合金肉盛溶接４ａ又はコバルト基合金肉盛溶接４ｂとの関係を更に詳細に説明すると、コバルト基合金肉盛溶接４ａ又はコバルト基合金肉盛溶接４ｂは、重量％でＣｒ２６～３２％、Ｗ３～６％、Ｆｅ＜３％、Ｍｏ＜１％、Ｎｉ＜３％、Ｃ０．９～１．４％、Ｓｉ＜２％、Ｍｎ＜１％、残部Ｃｏよりなるコバルト基合金（商品名：ステライトＮｏ．６）の溶接材料を、ステンレス鋼製蒸気ター

ビン動翼シュラウドカバー1の溶接面に、粉末プラズマトランスファアーク溶接またはＴＩＧ溶接等の溶接法により肉盛り溶接したものである。

【００１６】この様な構成のタービン翼の特性、利点を以下の実験を含めてかくにんした。即ち、タービン動翼シュラウドカバー接触面に要求される性質は、水蒸気中において面圧作用下で微小な振幅の繰返しすべりに対する耐摩耗性であり、この性質を満たす材料をシュラウドカバーの接触面に溶接肉盛りした。

【００１７】材料としては、重量%でＣｒ２６～３２%、Ｗ３～６%、Ｆｅ＜３%、Ｍｏ＜１%、Ｎｉ＜３%、Ｃ０．９～１．４%、Ｓｉ＜２%、Ｍｎ＜１%、残部Ｃｏよりなる材料（商品名：ステライトＮｏ．６）を選択し、これを粉末プラズマトランスファアーク溶接により動翼材料（ＳＵＳ６３０）表面に厚さ１mm溶接肉盛りして表面を機械加工した。

【００１８】この様に構成した材料を供試体Ｂとして摩耗テストを実施し、その結果の一例を図２に示した。なお、このテストでは室温水中で面圧ｐ＝２．９ｋｇ／ｍｍ$^2$、繰返しすべり範囲ΔＳ＝１２０μｍで繰返し数Ｎ＝３×１０$^6$ 回の往復すべりを与えて供試体を摩耗させた。

【００１９】また、供試体Ｂは前記したように動翼材（ＳＵＳ６３０）の上に、商品名：ステライト＃Ｎｏ．６を肉盛り溶接したものであるが、これと比較するため無処理の動翼材を供試体Ａとして採用し、両者の比較を行った。無処理の供試体Ａ（従来使用されてきた動翼材）に比べ、供試体Ｂ（本実施形態のもの）の摩耗量が著しく少ないことが示されている。

【００２０】即ちこのテストにより、重量%でＣｒ２６～３２%、Ｗ３～６%、Ｆｅ＜３%、Ｍｏ＜１%、Ｎｉ＜３%、Ｃ０．９～１．４%、Ｓｉ＜２%、Ｍｎ＜１%、残部Ｃｏよりなるコバルト基合金（商品名：ステライトＮｏ．６）は、水環境中での面圧作用下で微小な振幅の繰返しすべりによる摩耗に対して従来の無処理の動翼材に比較して摩耗量が著しく軽減できるので、この合金をタービン動翼先端シュラウド接触面に粉末プラズマトランスファアーク溶接またはＴＩＧ溶接等の溶接により肉盛りすることにより、耐摩耗性のすぐれた蒸気タービン動翼を提供できることが確認できた。

【００２１】この様に供試体を用いて動翼単体としての特性、利点を追求し、確認したがこの供試体Ｂで構成したタービン翼、及び同タービン翼を採用した蒸気タービンにおいては、シュラウドカバー部の接触面圧が上がっても耐摩耗性がすぐれるため、摩耗せず翼の振動特性が



劣化して共振を起こしたりすることがなく、長寿命の安定したタービンが得られる。

【００２２】以上、本発明を図示の実施の形態について説明したが、本発明はかかる実施の形態に限定されず、本発明の範囲内でその具体的構造に種々の変更を加えてよいことはいうまでもない。

【００２３】

【発明の効果】以上説明したように本発明によれば、先端にシュラウドカバーを形成した動翼において、周方向前後端で隣接する他の動翼のシュラウドカバーとの接触面に、重量%でＣｒ２６～３２%、Ｗ３～６%、Ｆｅ＜３%　Ｍｏ＜１%、Ｎｉ＜３%、Ｃ０．９～１．４%、Ｓｉ＜２%、Ｍｎ＜１%、残部Ｃｏよりなるコバルト基合金の溶接材を肉盛り溶接して蒸気タービン動翼を構成したので、同コバルト基合金の溶接材を相互に隣接する動翼のシュラウドカバーの接触面に肉盛り溶接して各シュラウドカバーの接触面の耐摩耗性を向上し、振動減衰効果の長期的維持を図り、翼破損等の事故に至る要因を生じさせず、安全性、安定性を確保する蒸気タービン動翼を得ることができたものである。

【００２４】また、請求項２に記載の発明によれば、前記請求項１の発明における動翼を有して蒸気タービンを構成したので、前記した様に耐摩耗性に富んだシュラウドカバーを有する動翼を採用により、シュラウドカバーの接触面圧が上がっても接触部は摩耗せず、翼の振動特性が変化して共振をおこしたりすることは無く、蒸気タービンの安定操業と長寿命の確保を図ることができたものである。

【図面の簡単な説明】

【図１】本発明の実施の一形態に係るタービン動翼の要部を概略的に示す説明図である。

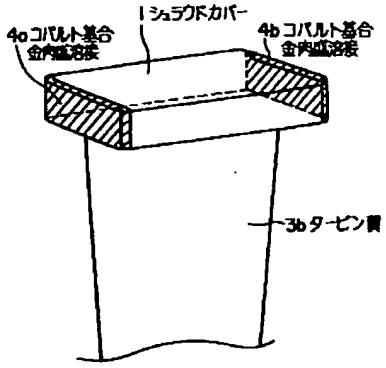
【図２】本実施形態における肉盛り溶接部材の特性を他との比較により示す説明図である。

【図３】従来の蒸気タービン動翼の要部を概略的に示す説明図である。

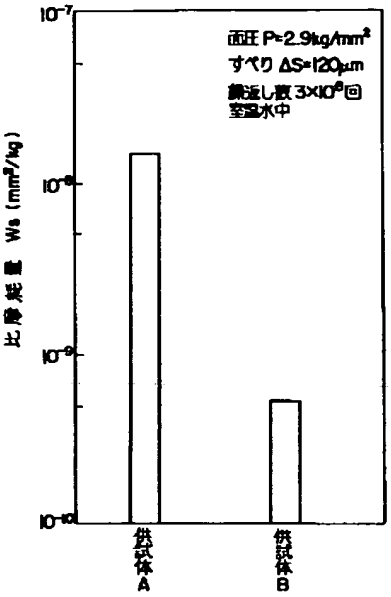
【符号の説明】

| | |
|---|---|
| １ | シュラウドカバー |
| ２ａ | シュラウドカバー |
| ２ｂ | シュラウドカバー |
| ３ａ | タービン翼 |
| ３ｂ | タービン翼 |
| ３ｃ | タービン翼 |
| ４ａ | コバルト基合金肉盛溶接 |
| ４ｂ | コバルト基合金肉盛溶接 |

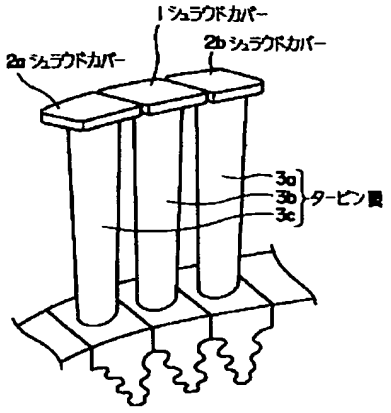
【図1】


1 シュラウドカバー
4a コバルト基合金肉盛溶接
4b コバルト基合金肉盛溶接
3b タービン翼

【図2】


面圧 P=2.9kg/mm²
すべり ΔS=120μm
繰返し数 3×10⁸回
室温水中
比摩耗量 Ws (mm³/kg)
10⁻⁷
10⁻⁸
10⁻⁹
10⁻¹⁰
供試体A
供試体B

【図3】


1 シュラウドカバー
2a シュラウドカバー
2b シュラウドカバー
3a
3b
3c
タービン翼

**DERWENT-ACC-NO:** 2000-093085

**DERWENT-WEEK:** 200008



**TITLE:** Shroud cover welding structure for moving blades in steam turbine bucket - is configured by welding contact surfaces of shroud cover of adjoining blades using cobalt@-based alloy

**PRIORITY-DATA:** 1998JP-0145939 (May 27, 1998)

**PATENT-FAMILY:**

| PUB-NO | PUB-DATE | LANGUAGE | PAGES | MAIN-IPC |
|---|---|---|---|---|
| JP 11336502 A | December 7, 1999 | N/A | 004 | F01D 005/28 |

**INT-CL (IPC):** C22C019/07, F01D005/22 , F01D005/28

**ABSTRACTED-PUB-NO:** JP 11336502A

**BASIC-ABSTRACT:**

NOVELTY - The shroud covers (1, 2a, 2b) are formed enclosing respective blades (3a-3c). The contact surface of the shroud cover of one blade with that of the adjoining blade is welded using a material containing cobalt base alloy which includes less than 1% of Mn.

DETAILED DESCRIPTION - The composition of the cobalt-based alloy includes 26-32 wt.% of Cr, 3-6 wt.% of W, 3% or less of Fe, 1% or less of Mo, 3% or less of Ni, 0.9-1.4% of C, 2% or less of Si, 1% or less of Mn, and remainder cobalt.

USE - For moving blades in steam turbine bucket.

ADVANTAGE - Improves antiwear quality of contact surface of each shroud cover and maintains oscillation alteration effect over long period of time. Prevents generation of accident causing factors such as blade damage. Ensures stable operation of steam turbine with long life.

DESCRIPTION OF DRAWING - The figure shows the schematic diagram showing the principal part of the turbine bucket. (1, 2a, 2b) Shroud covers; (3a-3c) Turbine blades.

# PATENT ABSTRACTS OF JAPAN

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C22C 19/07
F01D 5/22

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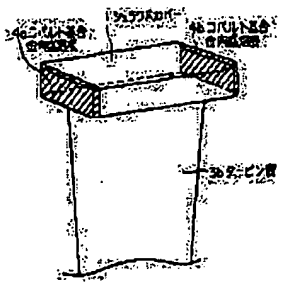
(22)Date of filing : 27.05.1998

(71)Applicant : MITSUBISHI HEAVY IND LTD
(72)Inventor : KONDO YOSHIYUKI
OYAMA KOJI

## (54) STEAM TURBINE MOVING BLADE AND STEAM TURBINE HAVING THE SAME

(57)Abstract:
PROBLEM TO BE SOLVED: To improve wear resistance of a contact surface and use the steam turbine moving blade safely and stably over a long period of time by cladding by welding a welding material of a cobalt base alloy having a specified composition to a contact surface of a shroud cover formed on the tips of plural moving blades adjacent to each other at the front and rear edges thereof in the circumferential direction.
SOLUTION: A turbine blade 3b is so constructed that a shroud cover 1 integrally formed on the tip thereof comes into contact with the shroud covers of the respective moving blades adjacent to each other in the circumferential direction to damp vibration. In this case, cobalt base alloy claddings 4a and 4b by welding are constructed on the both end contact surfaces of each shroud cover 1. The cobalt base alloy claddings 4a and 4b are formed by welding a cobalt base alloy as a welding material, which is composed of 26-32 wt.% Cr, 3-6 wt.%, W, <3 wt.% Fe, Mo<1 wt.%. Mo, <3 wt.% No, 0.9-1.4 wt.% C, <2 wt.% Si, <1 wt.% Mn and the balance Co on the welding surface of the shroud cover 1 made of stainless or the like by powder plasma transfer arc welding or the like.



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[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

* NOTICES *



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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

## TECHNICAL FIELD

[Field of the Invention] This invention relates to the steam turbine bucket which aimed at wear-resistant improvement in the bucket tip shroud covering contact surface, and the steam turbine equipped with this bucket.

[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]
[Drawing 1] It is the explanatory view showing roughly the important section of the turbine bucket concerning one gestalt of operation of this invention.
[Drawing 2] It is the explanatory view showing the property of the padding weld zone material in this operation gestalt by other comparisons.
[Drawing 3] It is the explanatory view showing the important section of the conventional steam turbine bucket roughly.
[Description of Notations]
1 Shroud Covering
2a Shroud covering
2b Shroud covering
3a Turbine blade
3b Turbine blade
3c Turbine blade
4a Cobalt base alloy build-up welding
4b Cobalt base alloy build-up welding

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[Translation done.]

## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the steam turbine bucket which aimed at wear-resistant improvement in the bucket tip shroud covering contact surface, and the steam turbine equipped with this bucket.
[0002]
[Description of the Prior Art] The correspondence to many problems in accordance with vibration is made for the insurance and stable operation, and the steam turbine which carries out high-speed rotation has some which spell and unite between [ which adjoins as the example ] aerofoils, and are being made into the vibrationproofing measure as unification or structure unified substantially.
[0003] If drawing 3 explains one of the approaches to spell such a conventional steam turbine aerofoil, the approach of producing the high periodic-damping effectiveness can often see by contacting the shroud covering 1 orthopedically operated by turbine-blade 3b and one in the aerofoil point to shroud covering 2a of the turbine blades 3a and 3c which adjoin each other in a hoop direction, and 2b.
[0004] However, when a skid occurs repeatedly by vibration of the aerofoil which compressive planar pressure acts on each of the contact surface of said shroud covering 1 and shroud covering 2a and the contact surface of the shroud covering 1 and shroud covering 2b, and is produced during operation etc., wear may arise in these contact surfaces.
[0005] When wear in this contact surface advances, the periodic-damping effectiveness expected in order that the geometry of shroud covering may change from a predetermined value is not not only acquired, but it may cause serious damage of aerofoil breakage etc.
[0006]
[Problem(s) to be Solved by the Invention] It was what has fault including possibility of causing serious damage of aerofoil breakage etc., without wear arising in the above mentioned appearance and the expected periodic-damping effectiveness being acquired in connection with this if it is in the thing of the conventional spelling method.
[0007] Since shroud covering consisted of same ingredients as an aerofoil body for this in the steam turbine bucket, although heat-resistant consideration was made, there is a place which lacks in consideration about abrasion resistance, and it became next to the possibility of the aerofoil breakage accident which this became a cause, did not come to obtain sufficient periodic damping, and was described above.
[0008] Let it be a technical problem to offer the steam turbine which this invention was proposed under such a background, improved the abrasion resistance of the contact surface of said shroud covering, continued at the long period of time, and was equipped with insurance, the turbine blade with which use can be presented stably, and this turbine blade.
[0009]
[Means for Solving the Problem] In the bucket which was made that this invention should solve the above mentioned technical problem, and formed shroud covering at the tip To the contact surface with shroud covering of other buckets which adjoin at a hoop direction order edge weight % -- 26 - 32% of Cr(s), W3-6%, and Fe -- < -- 3%, Mo<1%, and nickel -- < -- 3%, 0.9 - 1.4% of C, Si<2%, and Mn -- < -- the steam turbine bucket which carried out buildup welding of the welding material of the cobalt base alloy which consists of the remainder Co is offered 1%.
[0010] That is, the welding material of the cobalt base alloy (trade name: Stellite No.6) of the component which was described above according to this invention is selected, buildup welding of this is carried out to the contact surface of shroud covering of the bucket which adjoins mutually, the abrasion resistance of the contact surface of each shroud covering is improved, long-term maintenance of the periodic-damping effectiveness is aimed at, the factor which results in accident, such as aerofoil breakage, is not produced, and the turbine bucket which secured safety, stability, and a longevity life is obtained.
[0011] Moreover, this invention offers the steam turbine which comes to have the bucket of a configuration of having described above.
[0012] That is, since the bucket which has shroud covering which was rich in abrasion resistance is adopted as the above mentioned appearance according to the steam turbine of this invention, even if the contact planar pressure of shroud covering goes up, it does not wear out, but the oscillation characteristic of an aerofoil changes, and this contact section does not cause resonance, and aims at stable operation and long lasting reservation.
[0013]
[Embodiment of the Invention] One gestalt of operation of this invention is explained based on drawing 1 and drawing 2 . 3b is a

turbine blade and forms the shroud covering 1 at the tip in one. And cobalt base alloy build-up welding 4a is made by the end of this shroud covering 1, and cobalt base alloy build-up welding 4b is formed in it like the other end.
[0014] Moreover, although the illustration abbreviation is carried out, cobalt base alloy build-up welding 4a of said shroud covering 1 and cobalt base alloy build-up welding 4b are countered, and cobalt base alloy build-up welding is formed also in shroud covering prepared at the tip of other turbine blades which adjoin said turbine-blade 3b before and behind a hoop direction, respectively.
[0015] If the relation between this shroud covering 1, cobalt base alloy build-up welding 4a, or cobalt base alloy build-up welding 4b is further explained to a detail Cobalt base alloy build-up welding 4a or cobalt base alloy build-up welding 4b By weight %, 26 - 32% of Cr(s), W3-6%, Fe<3%, Mo<1%, The welding materials of the cobalt base alloy (trade name: Stellite No.6) which consists of the remainder Co 0.9 - 1.4% of C, Si<2%, and Mn<1% nickel<3% Buildup welding is carried out to the welding side of the steam turbine bucket shroud covering 1 made from stainless steel with welding process, such as powder plasma transfer arc welding or TIG arc welding.
[0016] Including the following experiments, did not write and boil the property of such a turbine blade of a configuration, and the advantage, and they were carried out. That is, the property required of the turbine-bucket shroud covering contact surface is [ be / it / under / steam / setting ] the abrasion resistance to the repetition skid of the amplitude minute under a planar pressure operation, and carried out the welding padding of the ingredient which fulfills this property to the contact surface of shroud covering.
[0017] as an ingredient -- weight % -- 26 - 32% of Cr(s), W3-6%, and Fe -- < -- 3%, Mo<1%, and nickel -- < -- 3%, 0.9 - 1.4% of C, Si<2%, and Mn -- < -- 1%, the ingredient (trade name: Stellite No.6) which consists of the remainder Co was chosen, 1mm welding padding of this in thickness was carried out to the bucket ingredient (SUS630) front face by powder plasma transfer arc welding, and the front face be machined.
[0018] Thus, the wear test was carried out by having made the constituted ingredient into Specimen B, and an example of that result was shown in drawing 2 . In addition, by this test, it is a number of cycles N= 3x106 at 2 and repetition skid range deltaS=120micrometer p= 2.9kg [/mm ] planar pressure in room temperature underwater. The both-way skid of a time was given and the specimen was worn.
[0019] Moreover, although Specimen B carried out buildup welding of trade name:Stellite #No.6 on bucket material (SUS630) as described above, in order to compare it with this, it adopted non-processed bucket material as a specimen A, and compared both. Compared with the non-processed specimen A (bucket material used conventionally), it is shown that there is little abrasion loss of Specimen B (thing of this operation gestalt) remarkably.
[0020] By this test, by weight %, namely, 26 - 32% of Cr(s), W3-6%, Fe<3%, The cobalt base alloy (trade name: Stellite No.6) which consists of the remainder Co 0.9 - 1.4% of C, Si<2%, and Mn<1% Mo<1% and nickel<3% Since abrasion loss can mitigate remarkably to wear by the repetition skid of the minute amplitude as compared with the bucket material which is not processed conventional ] under a planar pressure operation in hydrological environment By carrying out the padding of this alloy to the turbine-bucket tip shroud contact surface by welding of powder plasma transfer arc welding or TIG arc welding, it has checked that the wear-resistant outstanding steam turbine bucket could be offered.
[0021] Thus, since abrasion resistance be excellent even if the contact planar pressure of the shroud covering section go up in the steam turbine which adopted the turbine blade constituted from this specimen B, and this turbine blade although the property as a bucket simple substance and the advantage be pursue and checked using the specimen, it do not wear out, but the oscillation characteristic of an aerofoil deteriorate, resonance be cause, and the long lasting stable turbine be obtain.
[0022] As mentioned above, although the gestalt of implementation of illustration of this invention was explained, it cannot be overemphasized that this invention is not limited to the gestalt of this operation, but various modification may be added to the concrete structure within the limits of this invention.
[0023]
[Effect of the Invention] In the bucket which formed shroud covering at the tip according to this invention as explained above To the contact surface with shroud covering of other buckets which adjoin at a hoop direction order edge They are 26 - 32% of Cr(s), W3-6%, and Fe<3% at weight %. Mo<1%, Since buildup welding of the welding material of the cobalt base alloy which consists of the remainder Co was carried out and the steam turbine bucket was constituted 0.9 - 1.4% of C, Si<2%, and Mn<1% nickel<3% Carry out buildup welding of the welding material of this cobalt base alloy to the contact surface of shroud covering of the bucket which adjoins mutually, and the abrasion resistance of the contact surface of each shroud covering is improved. Long-term maintenance of the periodic-damping effectiveness is aimed at, the factor which results in accident, such as aerofoil breakage, is not produced, and the steam turbine bucket which secures safety and stability can be obtained.
[0024] Moreover, since according to invention according to claim 2 it has a bucket in invention of said claim 1 and the steam turbine was constituted The bucket which has shroud covering which was rich in abrasion resistance at the above mentioned appearance by adoption Even if the contact planar pressure of shroud covering goes up, it cannot wear out, but the oscillation characteristic of an aerofoil can change, and the contact section cannot cause resonance, and can aim at stable operation of a steam turbine, and long lasting reservation.

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[Translation done.]